

Replies to reviewer comments for MS acp-2013-930
“Indoor/outdoor relationships of quasi-ultrafine, accumulation and coarse mode particles in school environments in Barcelona: chemical composition and sources”

Anonymous Referee #1

Received and published: 7 February 2014

The discussion paper is of high scientific quality. The presented data include size distributions (quasi-ultrafine, accumulation and coarse fractions) of major and trace PM components for a number of schools in Barcelona. Indoor and outdoor exposures are examined, while the obtained results are used in order to identify main indoor and outdoor sources. The paper is well organized and contains sound explanations and conclusions, based on an extensive experimental data set.

We appreciate the reviewer's comments, and understand that no actions should be undertaken with regard to the manuscript.

Anonymous Referee #2

Received and published: 22 February 2014

This is a review of Indoor/outdoor relationships of quasi-ultrafine, accumulation and coarse mode particles in school environments in Barcelona: chemical composition and sources”. Authors, with their work, try to reach a praiseworthy objective of characterizing the size segregated components of indoor and outdoor PM in school environments in Barcelona. The produced data set and the stated discussion could be of great value, and it was a well written manuscript. Thus this work is suggested for publication by addressing the following comments.

We appreciate the reviewer's comments, and address his/her comments below.

1- In the title I would suggest to omit the “sources”. Despite some speculation about the sources, a source identification or apportionment analysis was not accomplished.

The title has been modified and shortened as follows: “Indoor/outdoor relationships and mass closure of quasi-ultrafine, accumulation and coarse particles in Barcelona schools”

2- In the introduction section, the rationale behind doing the study needs to be more clarified. The author should mention the originality of the paper considering existing literature. Do we just expect to see PM characterization in a new location (Barcelona school environments) or it includes more novelty. The produced data set could be of great value, however a reader needs to know if there is any novelty or originality in the adopted method as well. In which case, such novelty needs to be also reflected in the methods and findings of the paper.

The novelty of the paper is linked to the fact that the chemical characterization of quasi-ultrafine, accumulation and coarse particles was carried out:

- a) in indoor and outdoor air at a large number of schools in Barcelona, and thus representing child exposure to these particulates. Studies of school exposures to UFPs are very scarce and recent, and focus mostly on particle number concentrations (see for example the UPTECH study in Australia);
- b) for the first time in Spain and Barcelona, and thus at a new location;

- c) using quartz fibre filters (as opposed to Teflon), analysed by acid digestion and determining >50 major and trace elements by ICP-MS and ICP-OES, therefore using a novel type of substrate for ultrafine particles.

This has been described in the Introduction section with the following text: “This work aims to go beyond current state of the art by providing chemically-speciated data of quasi-UFPs impacting child exposure during school hours (indoors), which to the authors’ knowledge is currently unavailable in the literature. In addition, this is also the first study which addresses quasi-UFP concentrations and mass closure in outdoor air in Spain, and more specifically with a dense spatial coverage across the city of Barcelona.”

3- In the introduction section, there is a focus on the size fractionated particle formation process and sources. I would suggest to focus on the main subject of the paper including some explanation of the link between such formation process and IN/OUT PM composition.

To clarify the link between particle formation processes and indoor air, the following sentence was added: “Aerosol indoor/outdoor (I/O) relationships are impacted by particle size distributions, given that infiltration of outdoor particles into indoor air is most efficient for accumulation mode particles, while diffusion losses dominate for the lowest size ranges of ultrafine particles (<100 nm) (Long et al., 2001).”

4- In the methods section the method of data analysis is not mentioned. As an example the content of page 8 line 23 to Page 9 line 7 are more of such methodology than results, which could be moved to the methods section.

The text suggested (pages 8 and 9) was moved to a new section “2.4. Data analysis”.

5- In the results section: few discussion and explanation is being repeated several times, it could be better if the authors merge some sections where applicable, summarize them and avoid such repeating.

The text was reviewed and repetitions were removed, merging some paragraphs and texts.

6- In section 3.2, several times it is referred to the size distribution of different substances as unimodal or bimodal distributions. Such statement could be argued by having just three size spans.

This was corrected by referring to “size distribution patterns” instead of “size distributions”, given that indeed only 3 size fractions are available. Also, the terms “unimodal and “bimodal” were removed, and reference is made to 1 or 2 “modes”, instead.